THE FRONTIER REGION OF MEXICO

Notes to Accompany a Map of the Frontier*

[With separate map, Pl. I, facing p. 24.]

The revolutions of Mexico may be said to have two breeding places. One is the broken, hot, and relatively moist country south and southwest of the capital city; the other is the long, desert, frontier region of the north. It is the latter that is of chief interest to citizens of this country. One of Mexico's most enthusiastic propagandists once likened the general shape of his fatherland to a cornucopia, or horn of plenty, and dwelt on the riches poured therefrom into the United States. But since military operations have been undertaken in the frontier region by revolutionists and by government troops of both Mexico and the United States, troubles rather than riches have been our chief importations from Mexico. And in the past few months much of the romance that has been associated with the memories of Spanish times has faded before the hard realities of military life in the hot, dry country through which runs the 1,600 miles of Mexican frontier.

The extended frontier of northern Mexico, lying for the most part in desert country, offers two chief difficulties to military transport: forage and water for beasts and long, sandy, or broken stretches difficult to cross. If motor transport be employed the military road becomes the chief immediate problem unless the field of operations is supplied by a railway, when its possession becomes one of the first objectives. Since labor is now nearly impossible to get, and since the materials must be hauled long distances in the United States before reaching the frontier, we may say that the problem is rather more changed in form than diminished in difficulty when we haul camp equipment, food and ammunition, medical stores and wounded by motor truck instead of horse power. Wood for fuel is still desirable, and to avoid the transport of water for the troops it is necessary to know the infrequent watering places.

There are a number of standard questions which the military man raises on looking over the possibilities of such a region. Where are the river bottoms with trees, and open plains with scrub, and mountain ranges with forest or woodland? Where are the springs and wells and desert "tanks"? Of railroads we shall speak later. At this point we wish to emphasize the character of military operations in places not reached by railroads. For the three main railway lines supply only a part of northern Mexico. And a military campaign directed against a revolution in that region, either by a central Mexican authority or by American forces, must always confront the problem of reaching in force those remote sections that are the haunts

*As to drainage, roads, and towns, the map is based on the "Map of Sonora, Chihuahua, and Coahuila, Mexico," 1:1,000,000, published in 1913 by the War College Division of the General Staff, Washington, D. C. For other sources see footnote 1.

of guerilla bands and small fugitive detachments. Trench warfare can be carried out only on the most limited scale. The power of concentration in a desert is limited even on the part of a rich nation. Northern Mexico has always been desert and it is now destitute. In the past few years trenches have been made around some of the besieged towns, but the trench stage has been short and has always been preceded and followed by tactical fighting in open country. The long and difficult march, the unexpected concentration of guns and men, in fact all the elements of surprise, are still possible over most of the frontier region.

The following notes deal with those features of the relief, climate, and vegetation of the frontier that are involved in one form or another in the problems of military control. They are followed by a reference to railways and by a note on the cities of Mexico, the two chief objectives in a protracted campaign.

The accompanying map, Plate I, represents the desert quality of the frontier region of the Southwest—the limited rainfall and the high temperatures of summer. An oval belt of exceptionally high temperature extends along the Rio Grande, and the same extremes appear again at the head of the Gulf of California. The whole region has most uncertain rains. In a single year from 12 to 20 inches of rain may fall, only to be followed by years of extreme drought, with a rainfall of but a few inches. El Paso is typical, with a rainfall as high as 18.30 inches in 1884 and as low as 2.22 in 1891.[1]

But let it not be supposed that the whole frontier region has a uniform climate and relief. The region may be divided into a number of natural provinces. At the extreme western end of the boundary and west of the Colorado River is a group of minor ranges in Southern California. East of the Colorado River is the Lower Colorado Basin of southwestern Arizona. Then comes a group of ranges which lie in southeastern Arizona and are continuous with the Sierra Madre of Mexico, the chief relief feature shown on Plate I. From El Paso southeastward runs the valley of the Rio Grande with various mountain ranges and knots on either hand such as the Guadalupe Mountains in western Texas. The lower Rio Grande runs through plains country.

Only a word is required for the westernmost section of the boundary. The frontier region here includes block mountains of less height but of the

[1] The climate, relief, and vegetation as set forth in the following description are taken with modifications from "Forest Physiography" by Isaiah Bowman, 1911. See the chapters on the Lower Colorado Basin and the Arizona Highlands, pp. 244-245 and 249-250.

The chief sources of climatic data for the map (Pl. I) were Bartholomew's "Atlas of Meteorology" and the monthly bulletins of the Observatorio Meteorológico-Magnético Central de México. The isohyets and January isotherms are based chiefly upon the former, the July isotherms upon the latter. For the immediate border region the various United States publications consulted include *U. S. Weather Bureau Bulletins Q and S, U. S. Geol. Survey Water-Supply Paper 301*, 1912 (Pl. I), and the wall map of Normal Annual Precipitation of the United States by Eugene Van Cleef (Rand-McNally Co., 1915).

Hann's "Handbuch der Klimatologie," Vol. 2, gives data for a few localities in northern Mexico, and a rainfall map is shown on p. 76, Vol. 1, of "Le Mexique au XX^{e} Siècle" (see bibliography at end of article).

FIG. 1—The river front of El Paso, Texas, with the Rio Grande in the middle ground and the Mexican town of Juarez beyond. Note the low stage of the river, characteristic of the greater part of the year, due to the general aridity of the climate. (Photo copyright by Underwood & Underwood.)

FIG. 2—The manoeuver field of the expeditionary force near the base camp at San Antonio, northern Chihuahua. The view is typical of the arid plain of this region, from which rise, island like, mountain ranges here and there, as in the right background. Note the ditches and the water hole in the foreground. (Photo copyright by Underwood & Underwood.)

same general character as the San Bernardino and San Jacinto Mountains of Southern California. The boundary crosses the Imperial Valley, famous no less for its position below sea level than for its fertile irrigated lands.

The region east of the Colorado River consists of lowlands with an extreme desert climate. The average precipitation along the entire boundary is about 8 inches and on the Yuma and Colorado Deserts it is but 2 or 3 inches. For 700 miles between the Rio Grande and the Pacific, the boundary line is crossed by only five permanent running streams. There are two periods of rainfall, one in midwinter and one in midsummer, the midsummer rainy period being known as the rainy season. The summer rains generally begin about the first of July and last until the middle of September. Soon after the first rain falls the vegetation assumes a spring-like aspect, leaves burst forth, hills and valleys are covered with grass, and a bewildering profusion of wild flowers covers the surface. The plants grow with great rapidity, their seeds mature before the rains cease, and in a month or so after the rains have stopped they have the somber colors typical of fall and winter.

On the whole the Mexican boundary district of the Lower Colorado Basin is treeless; the forests are confined almost entirely to the mountain ranges and the stream courses, but those in the latter situation are few in number and of insignificant size. On some of the desert spaces arboreal cacti and yuccas form open groves; on others, and especially the alkali spots, the ground is perfectly bare of vegetation. The streams are lined with Fremont cottonwood, black willow, box elder, walnut, sycamore, oak, mulberry, and ash.

Shrubs and grasses increase in number and variety on the foothills, and there is often an abundance of shrubbery in the ravines near timber line. The desert vegetation, with the exception of a few green-bark trees and shrubs, is dull and dusty and in general the plants have pulpy leaves, gums, and resins. Under 4,000 feet the rainfall is so low and the evaporation so high that true desert conditions prevail.

Upon the higher mountain slopes are limited areas with greater precipitation; hence islands of vegetation occur on the mountains, surrounded by great desert plains. The highest portion of the Lower Colorado province lies in south-central Arizona and includes a few mountain ranges—the Baboquivari, Carobabi, and Cobota Ranges—which break the continuity of the plains. The Gila, Mohawk, and Growler Mountains are important ranges farther west. None of them has a sufficient summit extent to provoke large quantities of rainfall, hence even the highest portions are scantily covered with tree growth.

There is a thin population along the entire boundary in the Lower Colorado region, the only towns of consequence being Douglas, Santa Cruz, Nogales, Yuma, and San Diego. Except for these towns and several score of small settlements in the principal valleys the boundary

zone between El Paso and the Colorado River has few permanent inhabitants.

The Arizona Highlands of southeastern Arizona are continuous with the Sierra Madre of Mexico and from a distinct province of the frontier region, extending across the boundary. They make a relief much more broken and distinctly higher than that of the Lower Colorado Basin province just west. Ranges worthy of mention are the San Luis (south of the boundary), San Jose, and Dog Mountains. At the summits of some of the main peaks is the Mexican white pine; on others, and growing at lower elevations also, is the yellow pine. In the fifty-mile desert west of El Paso are open "forest" patches of desert yucca, where the largest trees attain a height of 16 feet. The Fremont cottonwood is the most common, beautiful, and valuable shade tree in the whole Mexican boundary region. It grows naturally on almost every stream along the boundary and is found planted around the houses and along the irrigation ditches of almost every ranch.

A common tree or shrub through the desert Southwest is the mesquite. The vertical range is from sea level and even below sea level in the Colorado Desert up to about 5,500 feet. In the deserts of New Mexico, Arizona, and California it is a shrub which obstructs drifting sand, thus forming mounds of sand and lines of sand hills; in the most fertile places along the Colorado River and its tributaries it is a tree of considerable size. Along the Santa Cruz River in Sonora are forests of unusually large mesquite, with some individuals 2½ feet in diameter and 50 feet high.

The Rio Grande Valley consists of a string of basins connected by "shut-ins," narrower stretches where the river has cut across low ridges flanked by hills or mountains of moderate height. The Rio Grande is a storm-water stream, subject to great and sudden floods. The rainfall occurs principally in the form of violent showers or cloudbursts, which fill the dry or nearly dry stream beds of the tributaries with turbulent floods of short duration. Occasionally such floods rising at the same time in several tributaries destroy the irrigated lands of the main valley floor, where are located almost all of the principal towns.

The valley floor consists of alluvial lands cut into terraces by the river. The broadest terraces lie in the most noted basin of the valley, the "Jornado del Muerto," or "journey of death," in south-central New Mexico. It is 200 miles long by 30 or 40 miles wide, with abrupt and in places mountainous borders. The alluvial floor of the basin has a growth of grasses and stunted shrubs. Along the river bottoms are cottonwood trees. On the slopes at the basin margin with low elevations are yucca and cactus and higher up there is a scrubby growth of juniper, cedar, and oak. On the bordering ranges is a scattered tree growth, if the ranges are low; if high, they bear important growth of pine and fir. The Chisos, Davis, and Capitan

Ranges, and especially the Sacramento Range, have true woodland and forest growths between the 7,000-foot contour and the summit.

With the chief features of the relief, climate, and vegetation of the frontier in mind we may now turn to the location of the railways. They are a key to much of the military history of the region. Plate I shows the location of the three principal lines, one on the west which reaches Nogales, one in the center which terminates at Juarez opposite El Paso, and a third which crosses the Rio Grande at Ciudad Porfirio Diaz (Piedras Negras) half-way between El Paso and the Gulf. The value of the railways may be illustrated through their use by Huerta. His strategy consisted in keeping his soldiers posted, (1) in towns on the railway lines, (2) at border stations, (3) in the large cities whatever their location. Control of the railways has been essential to the life of one after another of the disorders of the frontier, since large quantities of the necessary supplies have been imported over these lines from the United States. Revolutions have therefore started at outlying points with the appropriation of live-stock which could be driven with the army and used as needed for food. Horses for mounts and mules for pack-train transportation could also be taken by force. Villages and groups of ranches became bases from which to launch attacks and furnished rough field hospitals for the wounded. Control of a section of one of the three main railways has always been one of the first objectives of a revolution in the desert country of northern Mexico.

Two years ago Professor Mark Jefferson wrote a short but very interesting account[2] of the relation of some aspects of Mexican geography to the revolution then in progress. His remarks are even more important at this time and may be quoted with but slight modification as follows:

"It is not generally realized that the revolutionary area in Mexico is far from the homes of the mass of the Mexican people and above all far below the level at which they live. Mexico is a curiously 'upstairs' country. Most of the people live on a plateau more than five thousand feet above the sea. This plateau area is outlined on the accompanying map (Fig. 5) with a dotted line. Its association with Mexican life is shown by putting on the map all the towns upwards of ten thousand people in 1910. It is evident at a glance that they are massed especially on the plateau. The population of the towns is roughly shown by the marks that represent them on the map, dots for ten thousand, bars for twenty, triangles for thirty, squares for forty, and circles for fifty thousand. Sixty thousand is shown by a dot within a circle, and so on. Three cities at the high, southern end of the plateau have over a hundred thousand: Guadalajara (118,799), Mexico (470,659), and Puebla (101,214).

"The revolution has not yet got up to this plateau, holding only the

[2] Mark Jefferson: The Revolution and the Mexican Plateau, *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 436-437, with map (here reproduced as Fig. 5).

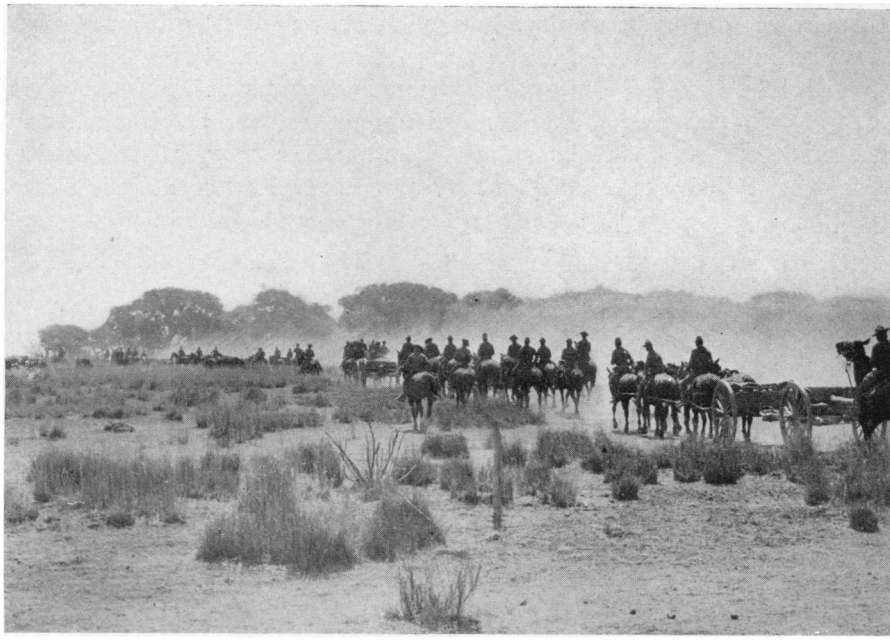

FIG. 3.

FIG. 4.

FIG. 3—Field artillery of the expeditionary force on the march, northern Chihuahua. Note the sparseness of the desert vegetation, only the water courses, as in the background, being lined with trees. (Photo copyright by Underwood & Underwood.)

FIG. 4—Soldiers from the expeditionary force watching Mexicans trying to construct a bridge over the Santa Maria River near El Valle, northern Chihuahua, which had been destroyed by a flood. The first bridge had been built by the engineers of the expeditionary force. The landscape is typical of that along the watercourses. (Photo copyright by Underwood & Underwood.)

northern country as far south as Torreon and some of the low country about Tampico in the east and south of the plateau border between Mexico and Guadalajara. The only cities of any size that the rebels hold as yet (May 7, 1914) are Chihuahua (39,061) and Monterey (81,006). Chihuahua is in the north, just off the plateau border and too far away from the Federal base for the Federals to hold, so they abandoned it. Monterey is also off the plateau, at only 2,000 feet, by far the largest city at so low a level.

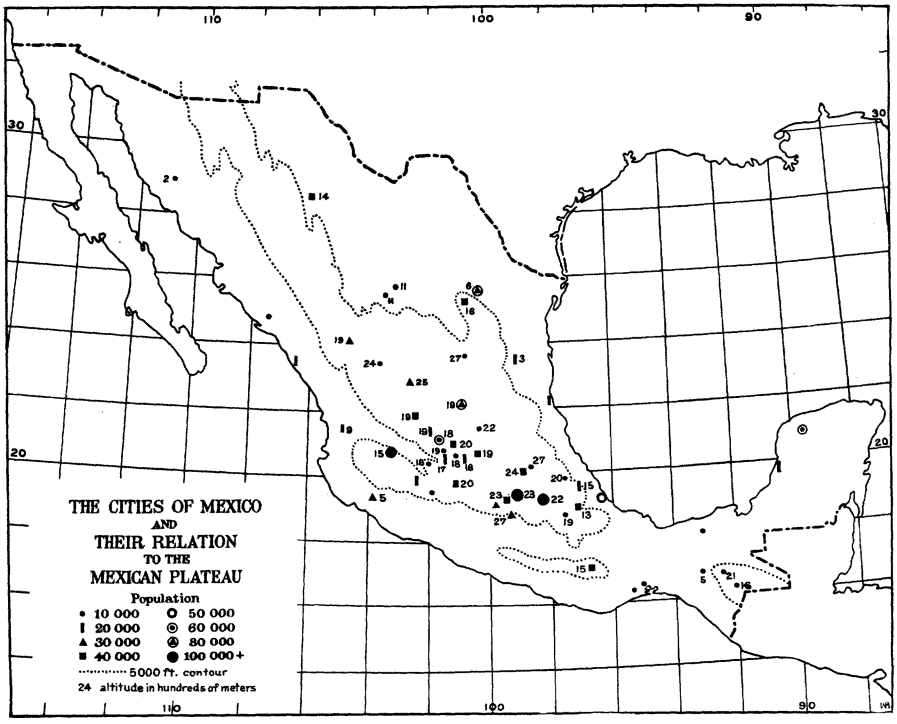

FIG. 5—Sketch map of Mexico showing the relation of the cities to the plateau. Scale, 1:26,000,000.

Saltillo (35,063), near it, is on the plateau, but this the rebels have gone by for the fighting near San Luis Potosí. Torreon is a small place. The population has not yet been reported for 1910, but ten years ago it was 13,800. The *area* held by the rebels is very large, perhaps a third of Mexican territory, but a great deal of it is uninhabited, with certainly less than one and a half of Mexico's fifteen million people, a bare tenth of the population. The task of the rebels is thus still mainly ahead of them.

"The cities of forty thousand (the squares on the map), are, from north to south: Chihuahua (39,061), Saltillo (35,063), Aguas Calientes (44,800), Guanajuato (35,147), Querétaro (35,011), Pachuca (38,620); then west of Mexico City, Morelia (39,160), close to the capital, Tacubaya (35,830), and, toward Vera Cruz, Orizaba (36,189). Oaxaca (37,469)

The American Geographical Society of New York

C. KRISCH DEL

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Clifton
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Cloudcroft
Felix
Vocanto
Hagerman
Silver City
Nutt
Fort Grant
Carlsbad
Lordsburg
Deming
Las Cruces
Cambray
Westwater
Cochise
Hachita
El Paso
Ciudad Juarez
Newman
Isleta
San Elizario
Dos Alamos
Porterville
Pecos
Pecos River
Tuta
Douglas
Agua Prieta
Boca Grande
L. de Guzman
Medanos
Fort Hancock
Colonia Diaz
Guzman
San Blas
L. de Sta. Maria
Tinajas de Cantarecio
Ascension
Rio Grande
Saragosa
Van Horn
Sta. Cruz
Cananea
Fronteras
Janos
Sabinal
Corralitos
San Pedro
Carrizal
Ahumada
Chupadero
Bacoachi
Carretas
S. Pedro
Ramos
Colonia Dublan
Casas Grandes
Marfa
Alpine
Nacozari
Bavispe
Arizpe
Nariz
Las Minas
Tres Castillos
Cucurpe
Pacheco
Pearson
Galeana
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El Valle
Carmen
Gallego
Moctezuma
Baviacora
Capilla
Tres Rios
Chuichupe
Cumbre
Agua Nueva
Laguna
Ojinaga
Terlingua
Ures
Madera
Namiquipa
Hormigas
La Mula
Sahuaripa
Falomir
Nacori
Dolores
Temosachic
Aldama
Soyopa
Bachiniva
L. San Bernabe
Chihuahua
Tinaja del Burro
Esperanza
Tacupeto
Mulatos
Guerrero
Tonichi
San Marcial
Suaqui Grande
Rio Chico
La Dura
Los Corrasos
Minaca
Cerro Prieto
S. Antonio
Palomas
Sta. Ysabel
Julimes
Meoqui
Comuripa
Nuri
Ocampo
Cusihuiriachic
Carretas
Bavanollava
Satevo
Saucillo
L. de Jaco
Jaco
Laguna
Mapoli
Jicamorachic
Carichic
Rio San Pedro
Uruachic
Creel
La Cruz
Santa Rosalia (Camargo)
Cedros
Corral
Cocorit
Baroyeca
Rio Yaqui
Nonoava
Valle de Zaragoza
Diaz
Sierra Mojada
Rincon
Buena
Tepahue
Macoyahui
Chinipas
Guazapares
S. Felipe
Cordero
Jimenez
Navojoa
Alamos
Rio Mayo
Urique
Batopilas
Balleza
Parral
Canas
Bacabachi
San Ygnacio
Sta. Barbara
Allende
Escalon
S. Cristobal
Mesa de Sandia
Rosario
Rio Florida
S. Ygnacio
S. Blas
El Fuerte
Km. 95
La Parida
Ls. Tlahualilo
Carmen
Cerro Gordo
Conejos
Tlahualilo
Guadalupe y Calvo
San Blas
Ahome
Bateve
Sinaloa
Guanacevi
El Oro
Inde
Zarca
Descubridora
Mapimi
Gomez Palacio
Lerdo
Torreon
Penoles
Pozole
Topolobampo
Guasave
Copalquin
Metates
Badiraguato
Topia
Tepehuanes
Boca de Cobre
Rio Nazas
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Pedricena
Velardena
Cuencame
Rio Mocorito
Rio Humaya
Rio San Miguel
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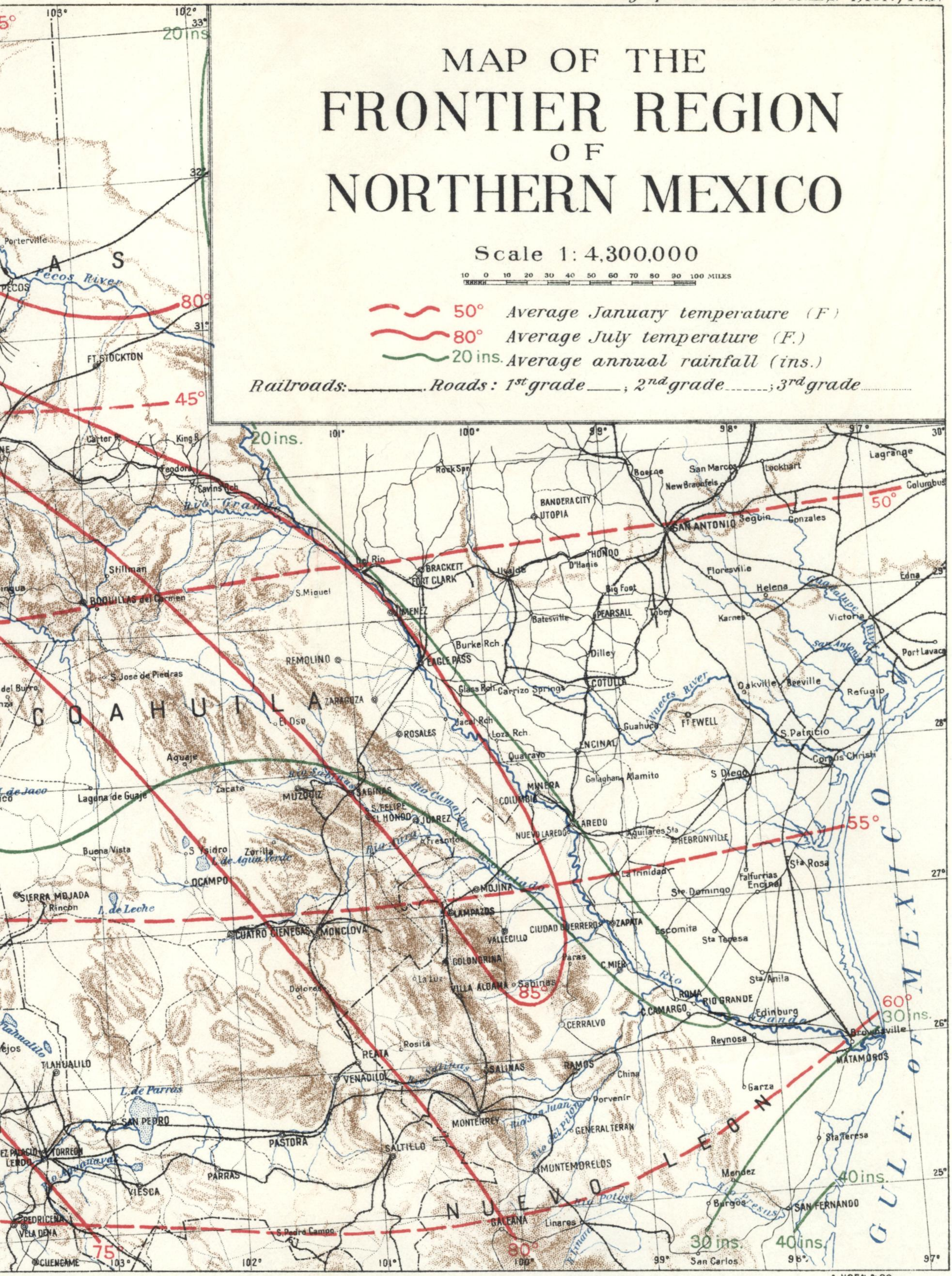
MAP OF THE
FRONTIER REGION
OF
NORTHERN MEXICO
Scale 1: 4,300,000
10 0 10 20 30 40 50 60 70 80 90 100 MILES
50° Average January temperature (F.)
80° Average July temperature (F.)
20 ins. Average annual rainfall (ins.)
Railroads: Roads: 1st grade ; 2nd grade ; 3rd grade
COAHUILA
NUEVO LEON
GULF of MEXICO
Pecos River
Rio Grande
Nueces River
SAN ANTONIO
Del Rio
EAGLE PASS
LAREDO
NUEVO LAREDO
MONTERREY
SALTILLO
TORREON
MONCLOVA
SABINAS
MATAMOROS
Brownsville
Corpus Christi
A. HOEN & CO.

stands isolated on a five-thousand-foot upland of its own farther south. The cities of thirty thousand (triangles) are: on the plateau southwest of Torreon, Durango (34,085); southeast of it, Zacatecas (25,905); near the capital, Toluca (31,247); and on lower ground nearer the west coast, Colima (25,148).

"Close beside each city symbol is a little number giving its elevation in hundreds of meters. These figures show that the larger cities are on higher ground near the southern end of the plateau about Mexico City, at elevations of seven or eight thousand feet. The heart of Mexico is now as always most vulnerable from Vera Cruz, on account of the nearness of the thickly settled regions to the sea in that neighborhood, though the ascent is steepest there and the low ground to be passed through most unwholesome."

At the request of this Society, Professor Jefferson has supplemented his former comments with the following paragraphs:

"The Mexican situation at the present, December, 1916, is quite different from that of the spring of 1914; but the scene of action is the same portion of the Mexican Republic, the thinly settled, desertic, and arid north. Even a strong government would have trouble maintaining order in a region so poor in food and water, where the only thing that abounds is empty space. Given a desperate insurgent who is inured to hunger and thirst, in such a region he finds his best theater of operations.

"Turkey finds the problem of Arabia equally difficult, and has always found it so, for the geographic obstacles are the same. If the United States undertakes the pacification of northern Mexico she will have the same difficulties to solve. American troops may be trained to ride like Mexicans, to find their way and fight in the desert like them, but they cannot hope to match them in *doing without,* an art in which the Mexican has a lifelong training, and the American none. For this reason the problem of reducing northern Mexico will involve supply trains that will be costly out of all proportion to the numbers involved. It will not be comparable to the former Mexican war, which was a war with a government established in the heart of Mexico and attacked there."

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—— Report of the Boundary Commission upon the Survey and Re-Marking of the Boundary between the United States and Mexico west of the Rio Grande, 1891 to 1896. 3 vols. (i. e. text, album of views, and atlas). State Department, Washington, D. C., 1898. [The atlas contains 18 sheets on the scale of 1:60,000, covering the boundary from El Paso to the Pacific.]